The Language of Programming

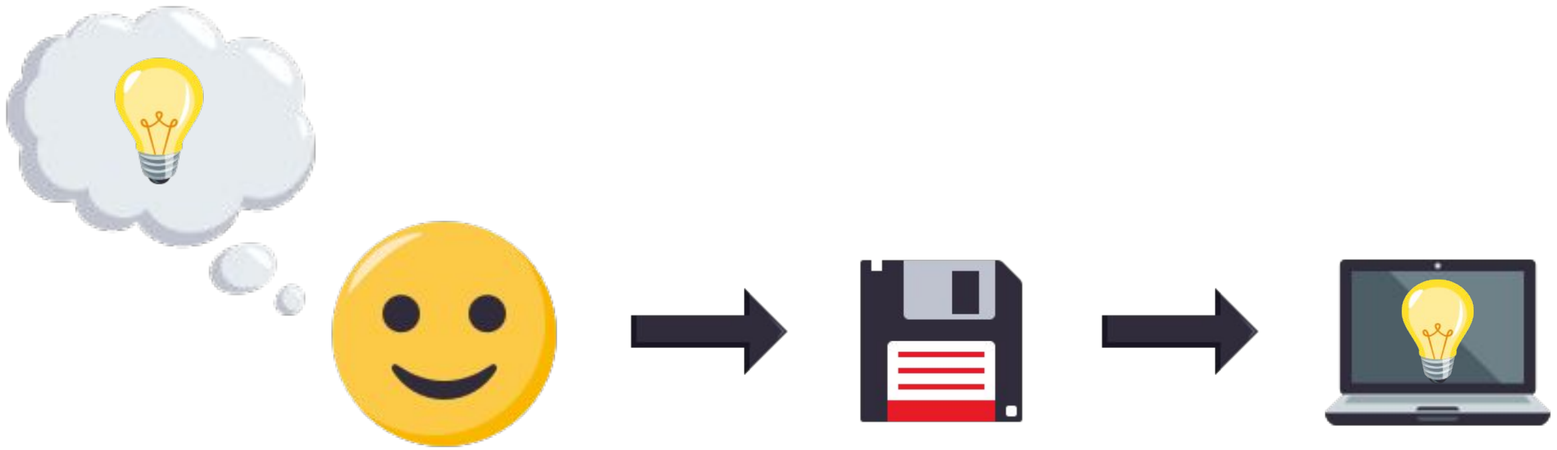
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what is code?

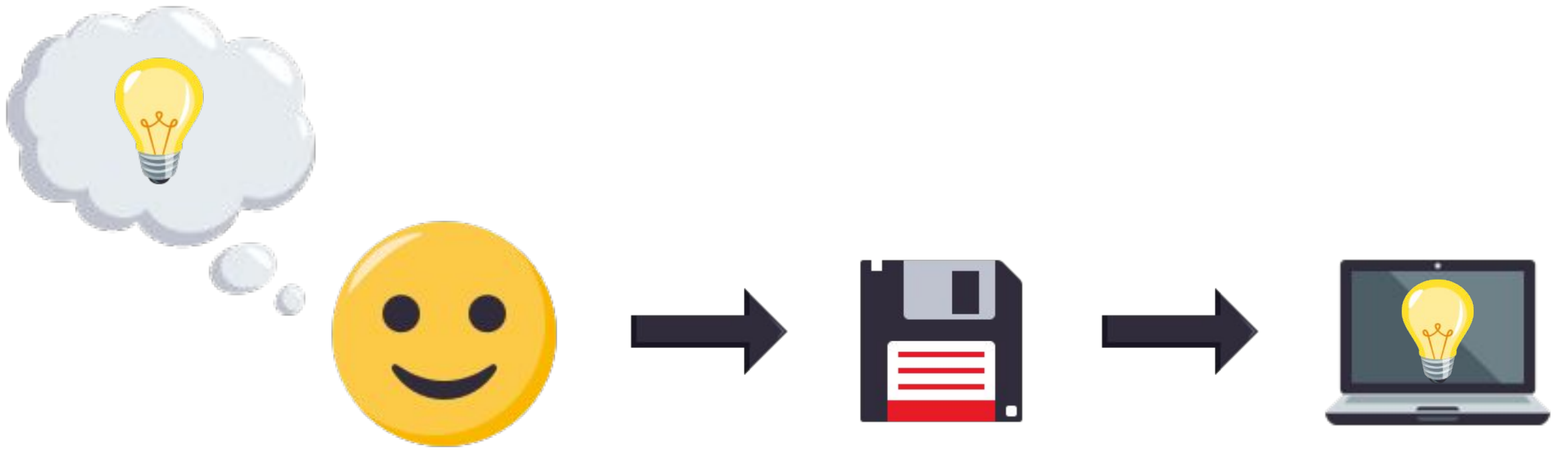
language

language
for machines

language for machines



language for machines?



“a computer language is not just a way of getting a computer to perform operations...”

-*Structure & Interpretation of Computer Programs*

"...it is a novel formal medium for expressing ideas about methodology."

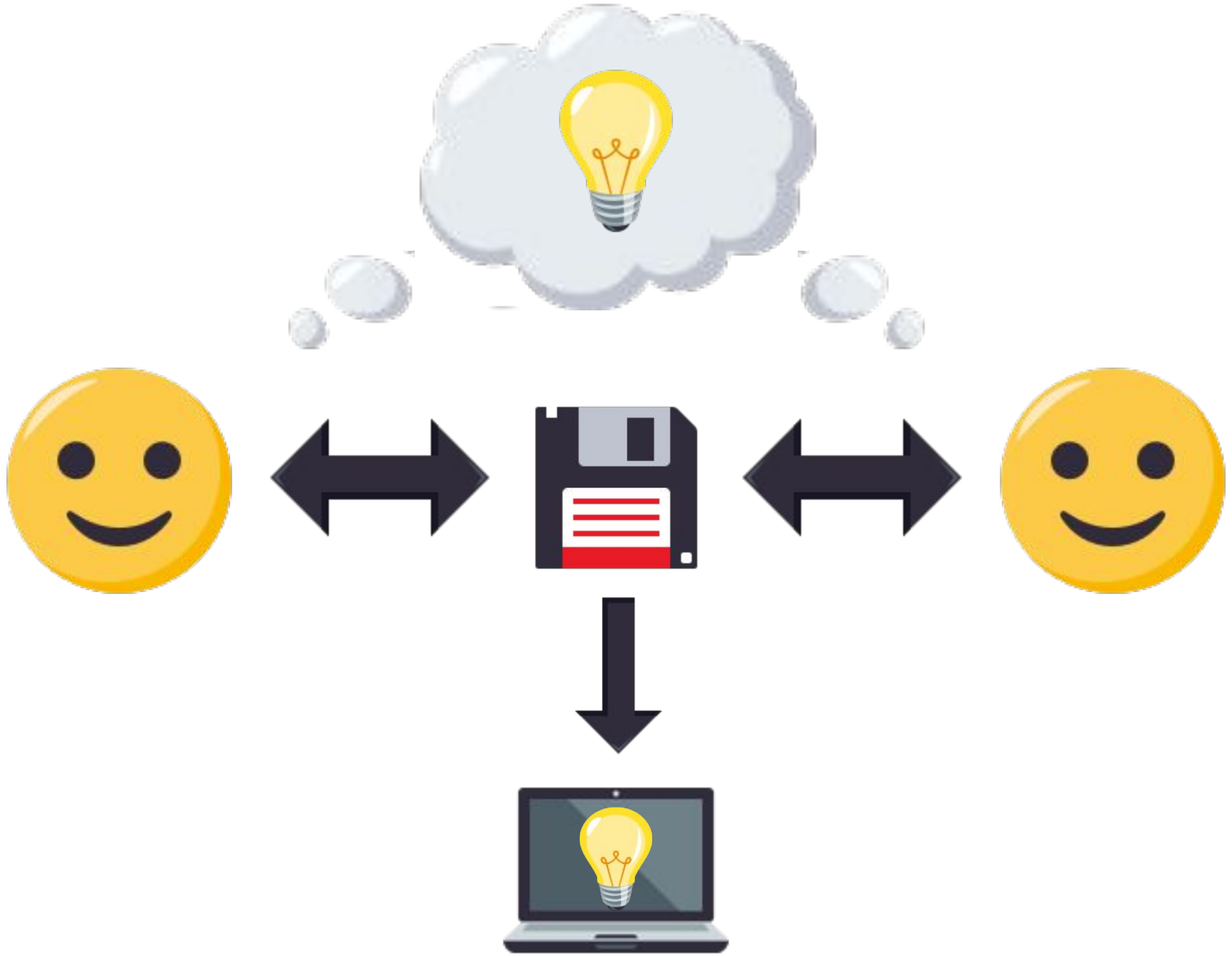
-*Structure & Interpretation of Computer Programs*

"Thus, programs must be written **for people to read**, and only incidentally for machines to execute."

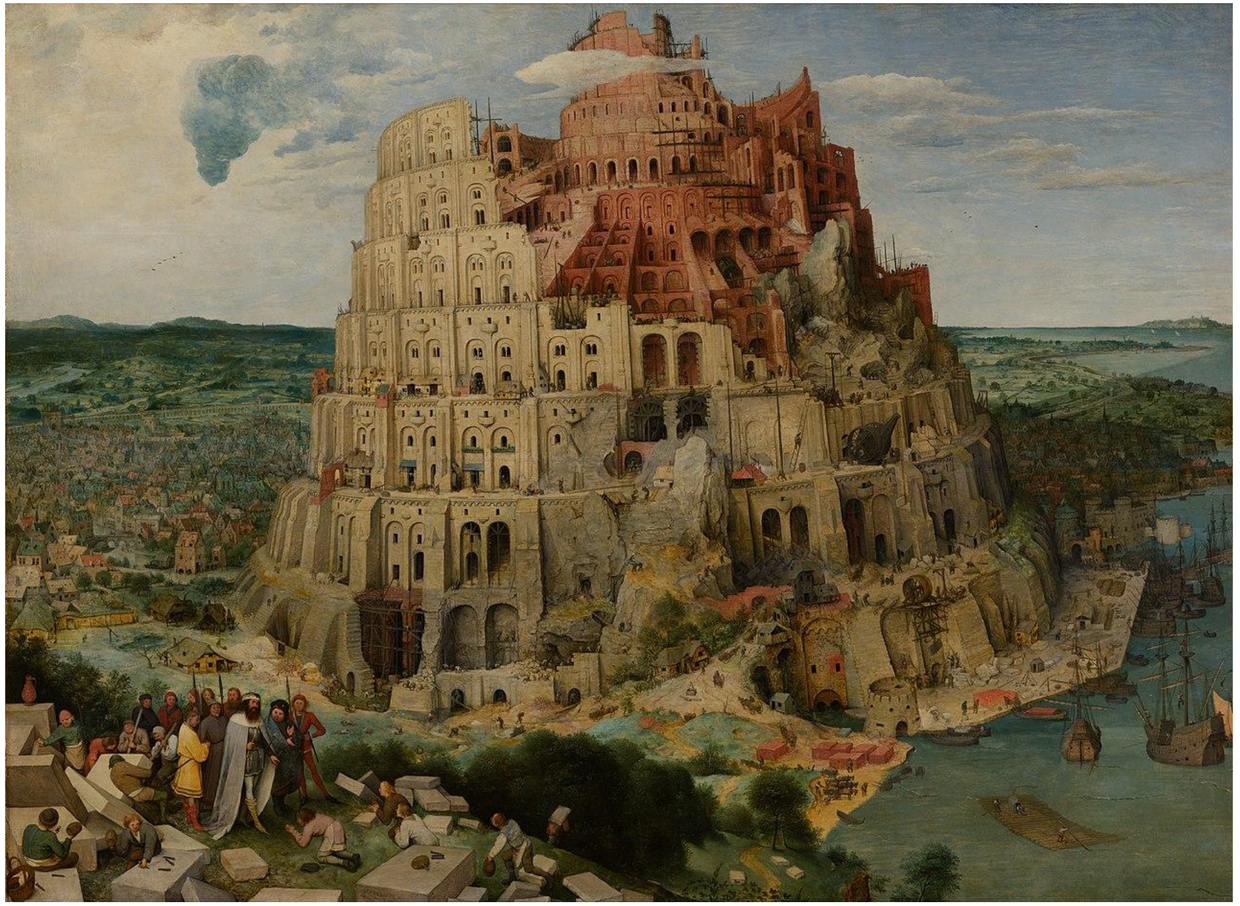
-*Structure & Interpretation of Computer Programs*

language
for ~~machines~~
humans

it's all about collaboration

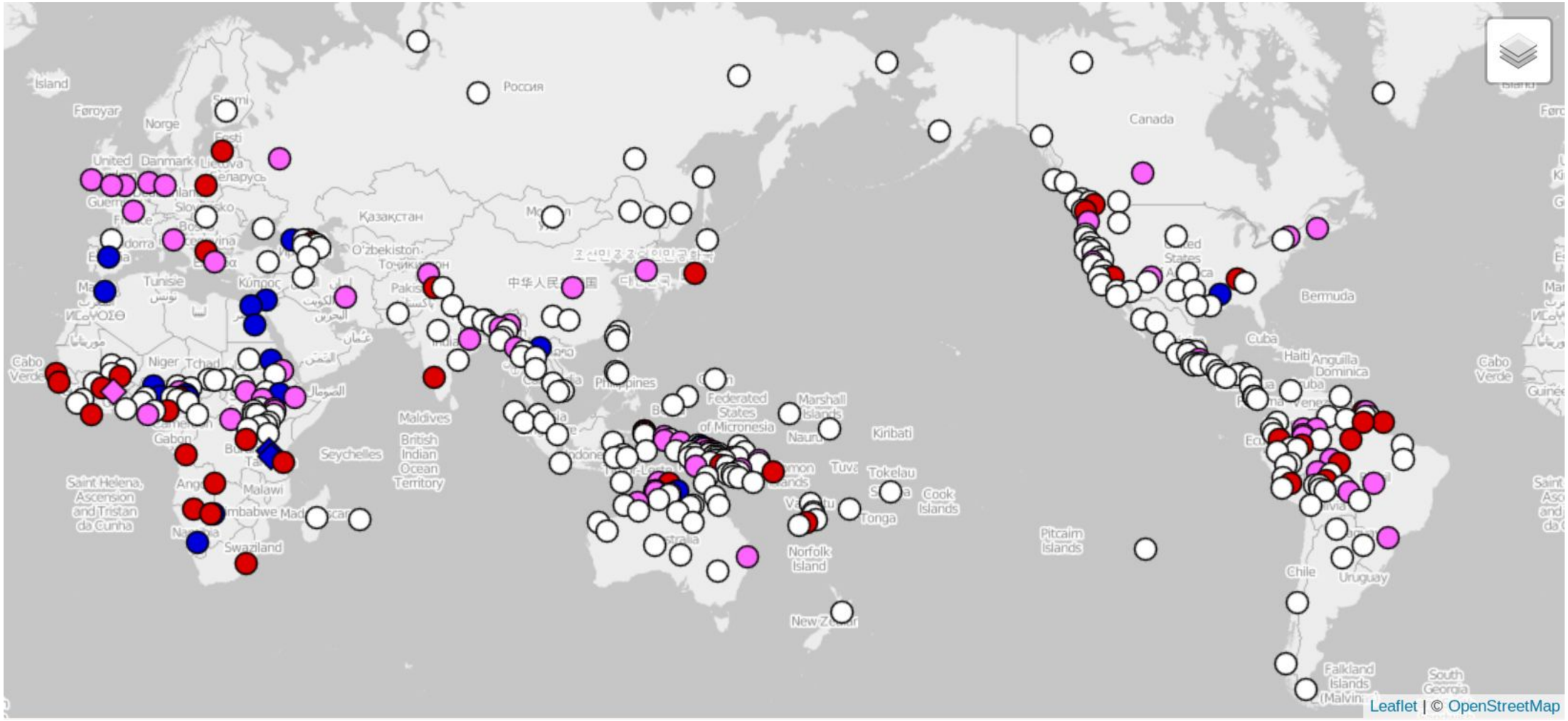


language is power



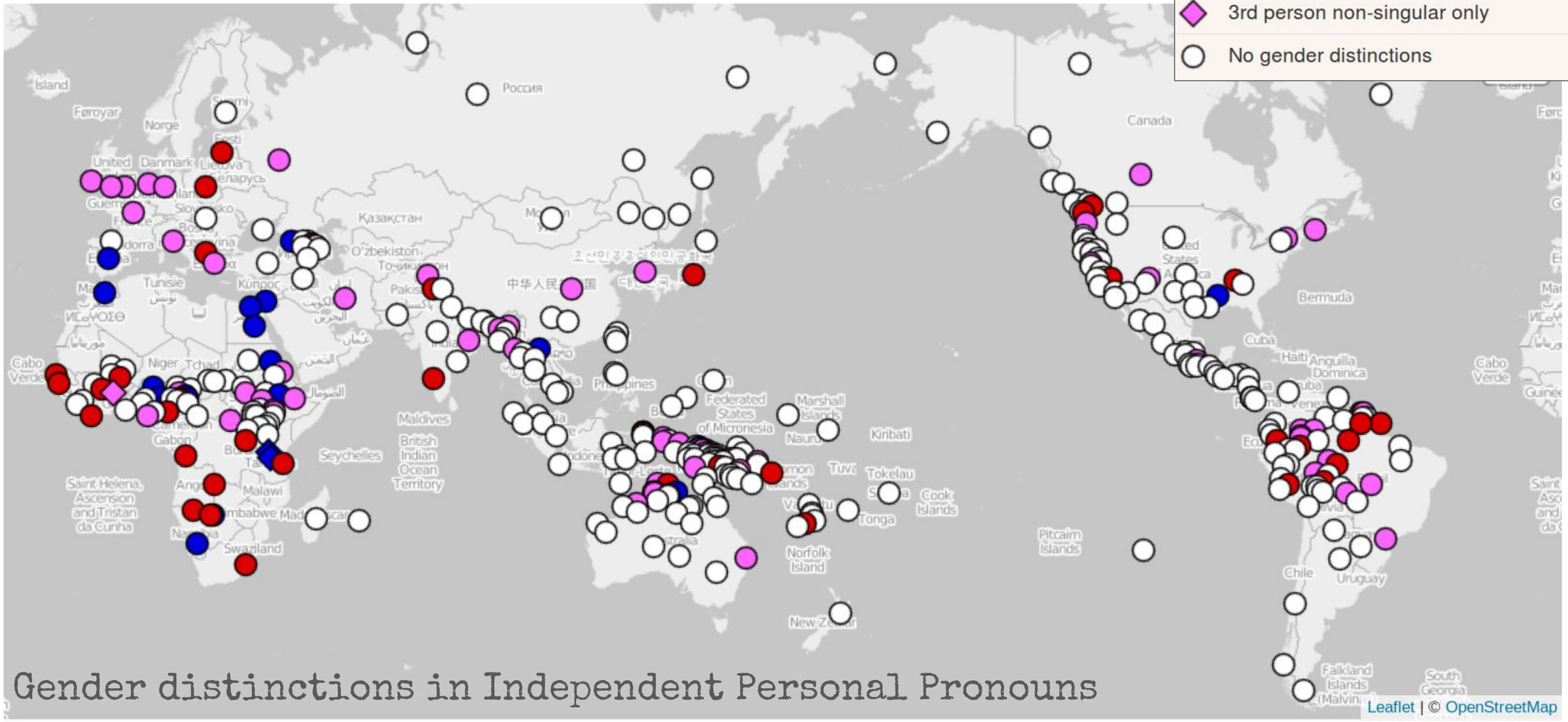
language
with many faces

every language matters



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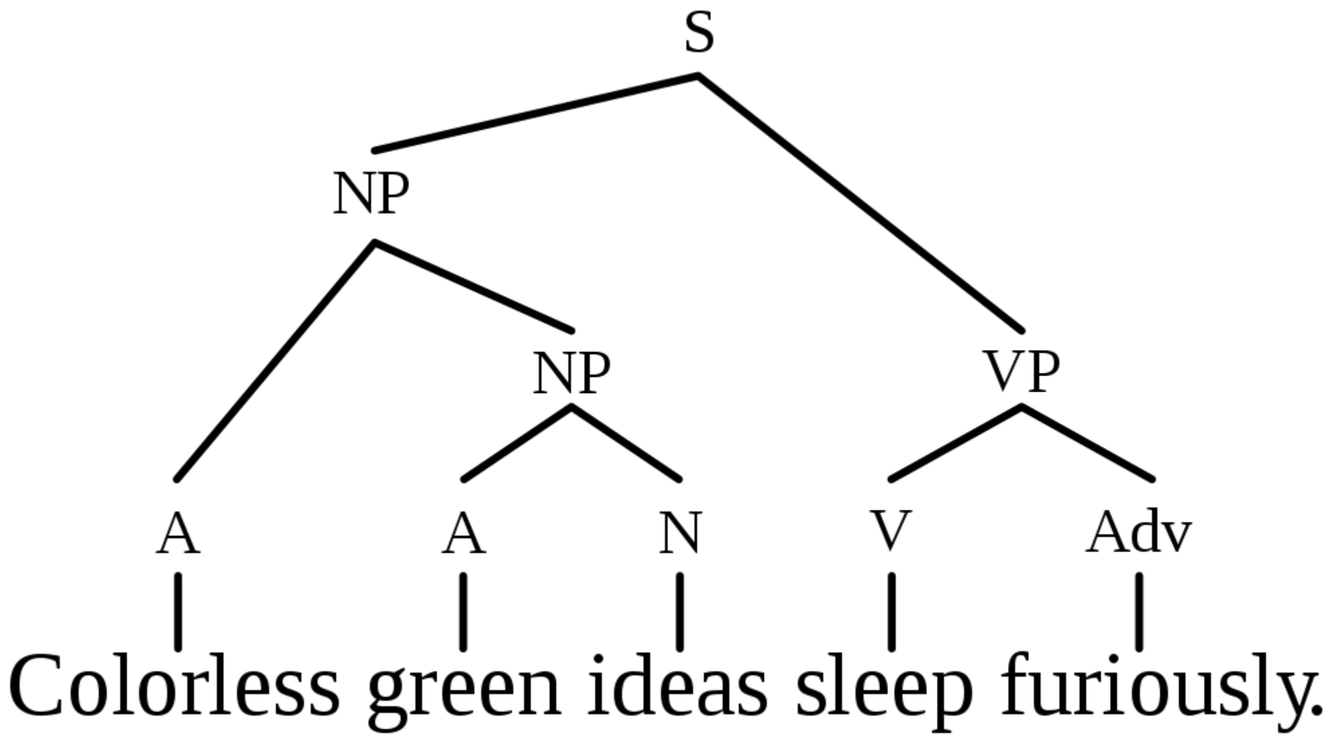
every language matters



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deconstructing language

deconstructing language



deconstructing language

texts

turns

sentences

phrases

words

morphemes

syllables

phonemes

phones

...etc

deconstructing programs

modules

functions

objects

types

expressions

lines

statements

instructions

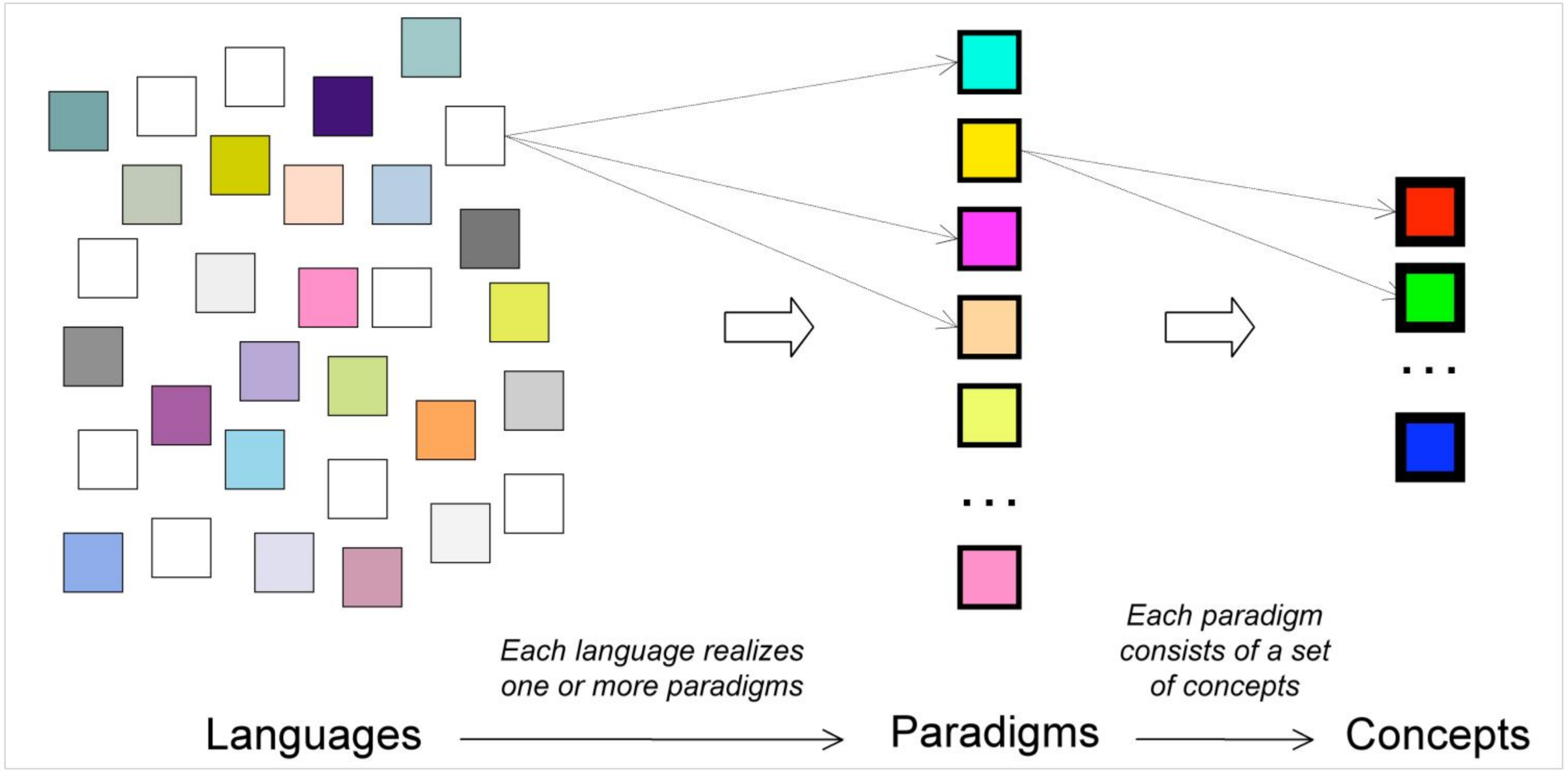
bytes

...etc

"There are no theory-neutral structures in linguistics."

-Michael Tomasello, Linguist

deconstructing paradigms



"Each paradigm supports a set of concepts that make it the best for a certain kind of problem."

-Peter van Roy, Computer Scientist

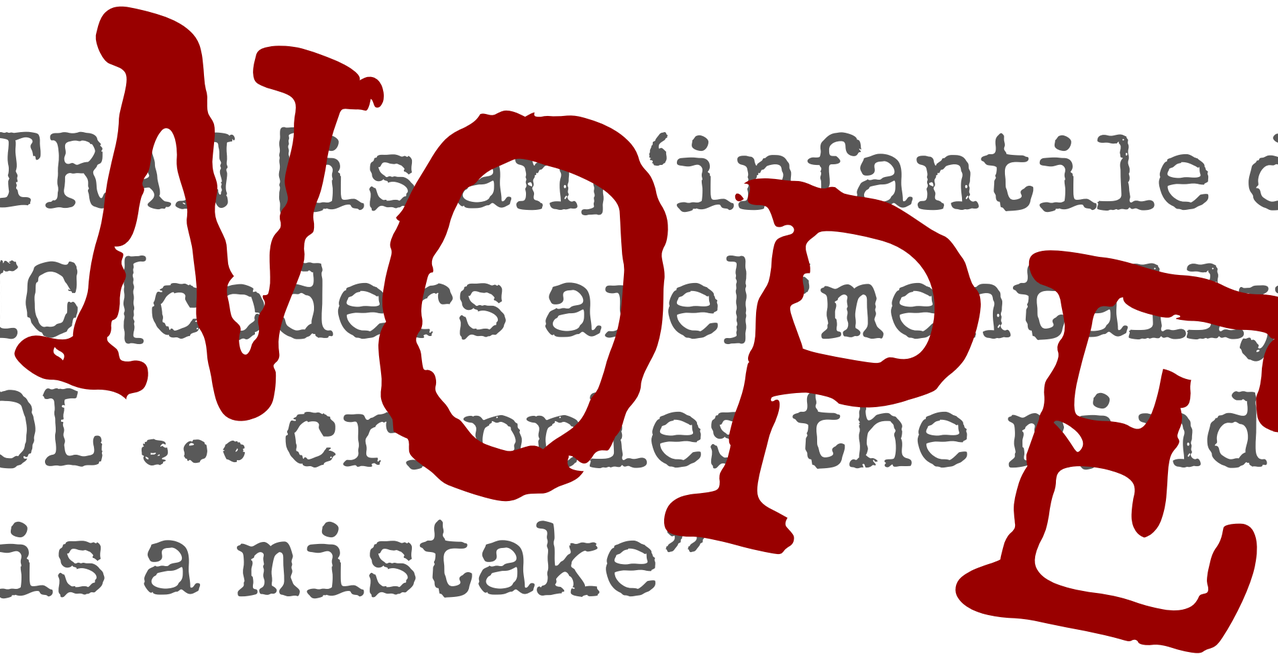
prescriptivism

prescriptivism

“FORTRAN [is an] ‘infantile disorder’”
“BASIC [coders are] ‘mentally mutilated’”
“COBOL ... cripples the mind”
“APL is a mistake”

-Edsger Dijkstra, Curmudgeon

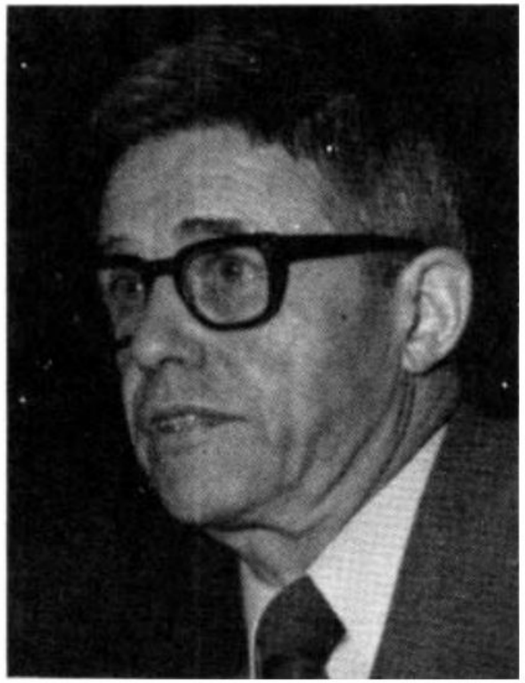
~~preseriptivism~~



"FORTRAN is an 'infantile disorder'"
"BASIC [coders are] mentally mutilated"
"COBOL ... cripples the mind"
"APL is a mistake"

-Edsger Dijkstra, Curmudgeon

APL ain't no mistake



1979 ACM Turing Award Lecture

Delivered at ACM '79, Detroit, Oct. 29, 1979

Notation as a Tool of Thought

Kenneth E. Iverson
IBM Thomas J. Watson Research Center

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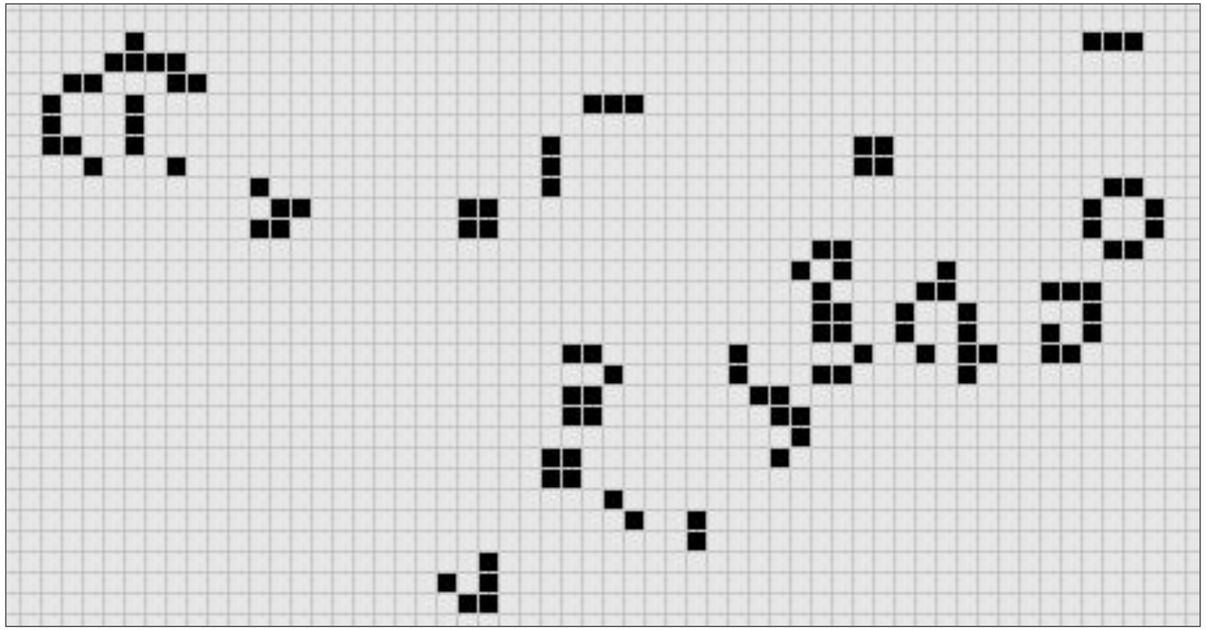
APL ain't no mistake

```
life←{↑1 ⍵∨.∧3 4=+/,¯1 0 1∘.⊖¯1 0 1∘.⌽⊂⍵}
```

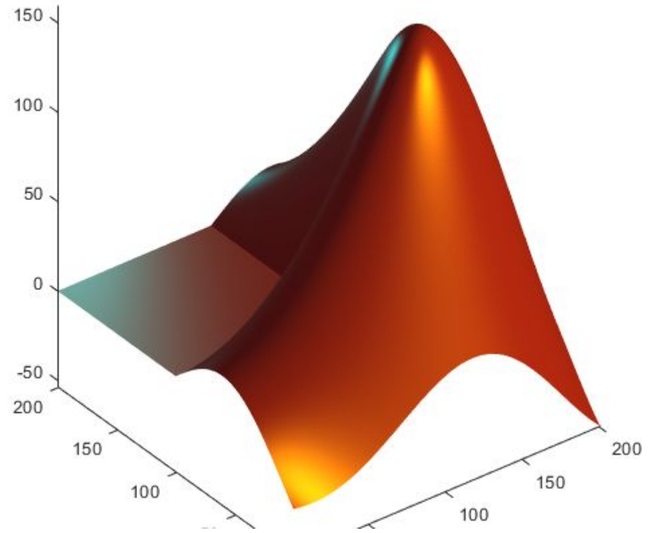
APL ain't no mistake

```
life←{↑1 ω∨.∧3 4=+/,¯1 0 1∘.⊖¯1 0 1∘.⌽⊂ω}
```

Conway's Game of Life in Dyalog APL



APL ain't no mistake



MATLAB®



APL ain't no mistake



"Languages are **cultural artifacts** that differ radically among different cultures, and languages change in important ways as the **communicative needs** of their speakers **evolve** over time."

-Michael Tomasello, Linguist

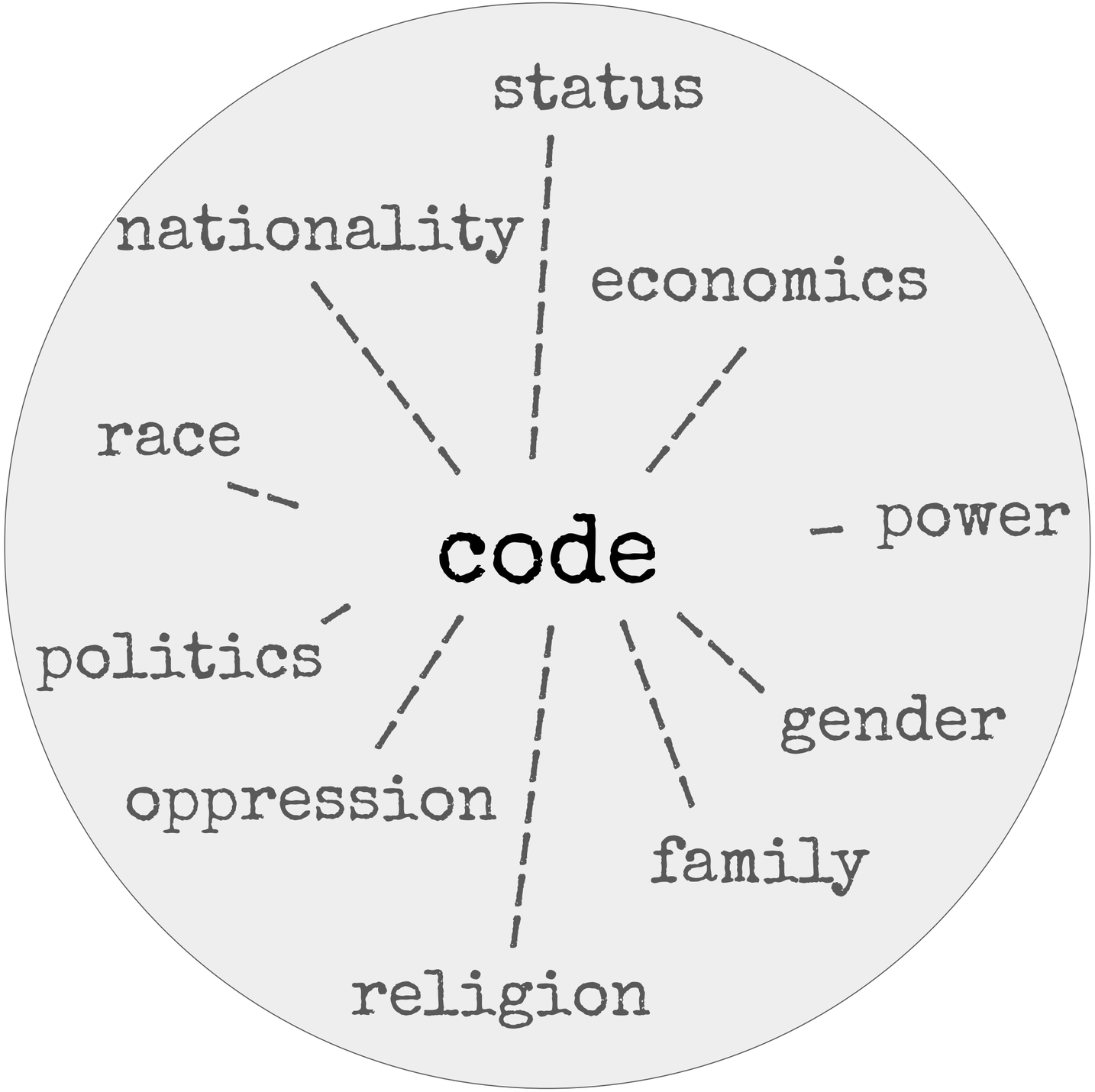
language
in context


language


status
nationality
economics
race
power
language
politics
gender
oppression
family
religion



@AnjanaVakil


status
nationality
economics
race
code
- power
politics
gender
oppression
family
religion

words are actions

words are actions



words are actions



s/whitelist/safelist
s/blacklist/blocklist

s/master/leader
s/slave/follower

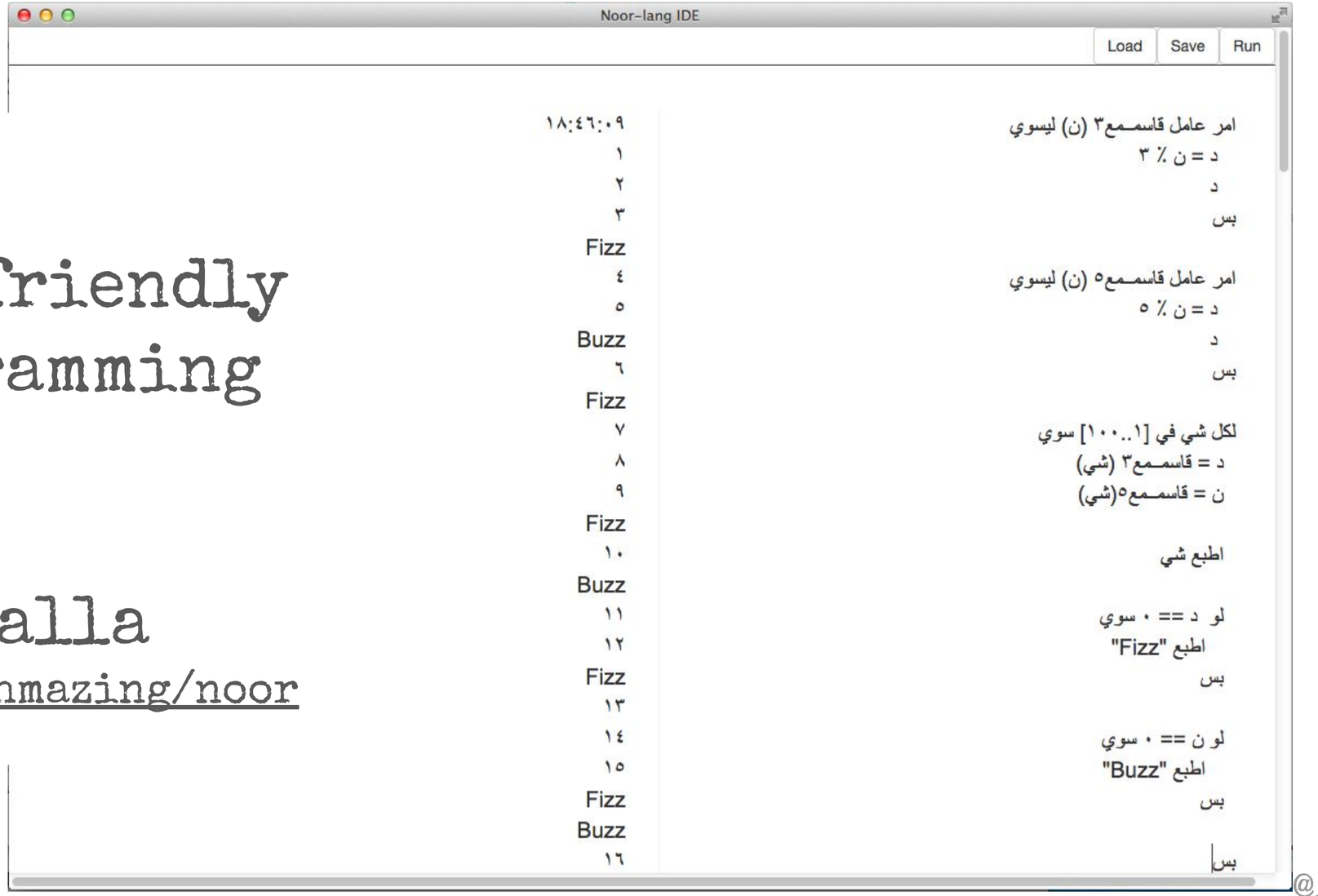
“If we're going to teach programming around the world, we have to be aware of what the cultural biases are.”

-Ramsey Nasser, Creator of قلب

teaching in context

Noor:
a beginner-friendly Arabic programming language

by Ahmed Abdalla
github.com/SimplyAhmazing/noor



@AnjanaVakil

language
to be acquired

we learn through context

we learn through context

```
foo = bar('baz')
```

we learn through context

```
result = analyze('data')
```

we learn out loud

```
result = analyze('data')
```

we learn out loud

```
result = analyze('data')
```

“result equals analyze data”?
“set result to analyze of data”?
“analyze string data becomes result”?
...?

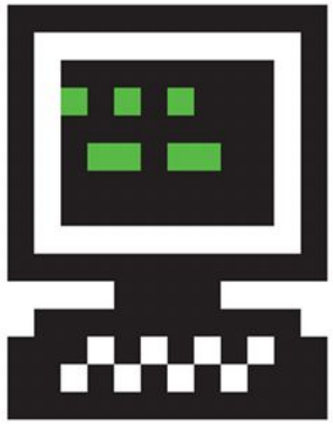
we learn out loud

"... can we really comprehend and communicate source code if we cannot vocalise it?"

– Felienne Hermans, Computer Scientist

we can't learn alone

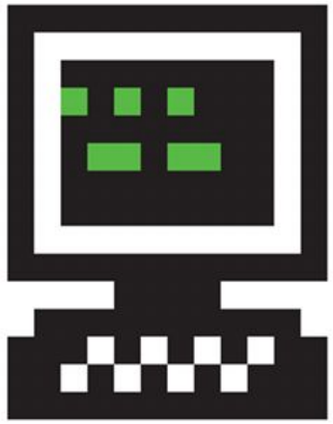
we can't learn alone



The
Recurse
Center

recurse.com

we can't learn alone



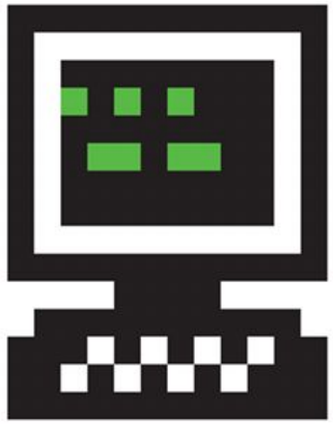
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recurse.com

OUTREACHY

outreachy.org

we can't learn alone



The **Recurse** Center

recurse.com

OUTREACHY

outreachy.org



mapbox

mapbox.com/careers

code

is

language

is

collaboration

is

power

what will we
do with it?

Thank you!

GOTO Chicago team

István "Flaki" Szmozsánszky, Perry Eising, Nicole Orchard, Max Rabkin, John Sylak-Glassman & everyone else who let me talk their ear off

The Recurse Center

Mapbox

References

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